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Applicant: NEC CORP

[Title Of The Invention]

THICK FILM PRINTED BOARD PROVIDED WITH I/O PINS

[Abstract]

PURPOSE: To prevent position deviation between I/O pins and conductor pads, and protect edge parts of the conductor pads, by forming a dielectric glass covering the periphery of edge parts of the conductor pads to which the I/O pins are soldered.

CONSTITUTION: Wiring conductor and through hole conductor 3 are printed on an alumina ceramic substrate 2 by a screen-printing method, and baked. Conductor pads 4 are formed on the through hole conductor 3. In order to prevent the exfoliation of edge parts of the conductor pads, reinforcement member 8 being dielectric glass is formed by a screen-printing method, and baked. I/O pins 7 made of Kovar provided with gold-tin solder material 6 are soldered on the conductor pads 4 by using a carbon jig, and a thick film printed board provided with I/O pins is obtained.

[Claim(s)]

1. The thickness film printing circuit board with the I/O pins which makes the matter that dielectric body inorganic member which covers marginal part of the above conductive pad in the thickness film printing circuit board with the I/O pins which has the I/O pins fixed on the above conductive pad with a wiring conductor and conductive pad being formed on the circuit board is set up characteristics.
2. The thickness film printing circuit board with the I/O pins of the request clause 1 mention which makes the matter that the above dielectric body inorganic member is dielectric body glass characteristics.
3. The production method of the thickness film printing circuit board with the I/O pins which forms the above wiring conductor and the above dielectric pad with a screen printing and which makes the matter that the above dielectric body inorganic member which covers marginal part of the above conductive pad is formed with a screen printing characteristics after firing.

[Detailed Description of the Invention]

This invention is related to the thickness film printing circuit board with the I/O pins which an input and output electric signal contact pin is specially fixed about thick film printing circuit board of hybrid integrated circuit.

[Description of the Prior Art]

Recently, corresponding to light, high density-ization and low cost-ization of device such as a computerized system has been miniaturized all the more by thick film printing circuit board as a substrate which carries an IC and LSI that is sped up.

The number of gates increases drastically, and the number of input and output terminals to connect it electrically in proportion to this with the outside of the circuit board increases with the increase of accumulation of every LSI in such a high density mounting board very much, too.

Because of that, the technology which forms an input and output terminal with an I/O pins made of the metal on the back of the circuit board is being developed. For example silver solder, gold, tin solder, and so on were used as the technology to fix an I/O pins on this thick film printing circuit board so far in alumina circuit board, and the I/O pins of the quality of the material by kovar, 4.2 alloy, and so on was being fixed by carbon jig.

The 2nd figure is the cross section of carbon jig to explain the example of the way of fixing a usual I/O pins. How to fix an I/O pins by this carbon jig is fired makes through hole conductor 3 made with the palladium in the ceramics circuit board 2, silver 1 platinum, the steel, and so on first in temperature about 850 degree C.

Next, a screen forms a conductor pad 4 such as gold, silver 1 palladium and silver 1 platinum and copper in this through hole conductor 3 by the way of printing it. Carbon jig 1c is put, and a load 5 is put on each pin next after the I/O pins 7 of kovar with solder 6 that silver or gold-tin will stick stuck to, or 4.2 alloy is inserted between carbon jig 1a and 1b and it positions the I/O pins 7 that a conductor pad 4 and a metal were plated.

Next, it is stored in the fireplace and so on every carbon jig, and heat treatment is done. And, the thing which kovar was used for the I/O pins 7 as is being used for solder material 6 which makes a conductor pad connect here the gold-tin alloy.

The 3rd figure is the cross section which shows the condition that an I/O pins is fixed on the circuit board. The ceramics circuit board 2 which the I/O pins 7 removed from carbon jig after the heat treatment connects with is shown in this figure. Generally eutectic alloy of the Au80wt percent-Sn20wt percent is being used for the formation of gold 1 tin solder 6, and the melting point is 280degree C, and management temperature with solder is about 420 degree C. And, it is dealing with it in the neutral atmosphere of nitrogen to prevent the oxidization of gold 1 tin solder.

#### [Problem(s) to be Solved by the Invention]

Though carbon jig is being used, some position deviations are sometimes caused in this before method between the I/O pins 7 and the conductor pad 4 on the occasion of the brazing processing by the dimension error of carbon jig, the dimension error of the ceramic substrate, the printing precision of the conductor pad 4, and so on.

The mechanical stress that it is given to the I/O pins 7 by this position deviation leans to the edge part of the conductor pad 4, and it is added, and the edge part of the conductor pad comes off, and there is a problem that the adhesion strength of the I/O pins makes it decline. The purpose of this invention is to provide the thickness film printing circuit board with the I/O pins which dissolves an applied problem.

#### [Means for Solving the Problem]

The thickness film printing circuit board with the I/O pins of this invention makes the matter that for example dielectric body inorganic member which covers marginal part of conductive pad sets up dielectric body glass characteristics. Moreover, after a screen formed a wiring conductor and conductive pad in the way of printing it on the circuit board and after firing these, it makes the matter that a screen forms dielectric body inorganic member which covers marginal part of the above conductive pad in the way of printing it characteristics how to manufacture a thickness film printing circuit board with the I/O pins by this invention.

#### [Example]

Next, a drawing is referred to for this invention, and it explains. The first figure is the cross section of the thickness film printing circuit board with the I/O pins which 1

execution example of this invention is shown in. As for this example, it is explained in accordance with the device process that it explains easily. First, for example a wiring conductor and through hole conductor 3 are printed on 96% alumina ceramic substrates 2 the above by the screen printing, firing is made. There are gold, silver, silver-palladium, silver 1 platinum, nickel, steel, and so on, and it can be used properly corresponding to the use as a conductor material here.

Next, a similar method is used for this through hole conductor 3 the above, and a conductor pad 4 is formed. This conductor pad material used comparatively strong silver 1 platinum of the adhesion strength with this execution example though it could be used for a variety as well as the conductor material, too. Next, to prevent peeling of the edge part of the conductor pad, the reinforcement member 8 which for example is dielectric body glass is formed by the similar screen printing, and fired.

Next, the one with soldering the I/O pins 7 manufactured by kovar which a gold 1 tin solder material 6 was attached to as well as the example so far by using carbon jig in conductive pad 4, and gets a thickness film printing circuit board with the I/O pins. Like this, it disappeared that an edge part came off by setting up the reinforcement member 8 which covered the edge part of conductive pad 4.

And, there is this reinforcement member 8 in the advantage as well to correct the position deviation of the I/O pins 7. As for the fourth figure, the graph which shows the distribution of the adhesion strength of the I/O pins which the one with soldering so far by the method, and the fifth figure are the graphs which show the adhesion strength distribution of the I/O pins which has the one with solder by the method in the execution example of this invention.

Incidentally, when I/O pins was fixed with the usual method and the method by this invention and that degree of adhesion was examined, it had the strength that the pin of many which were installed in comparison with the method so far was very uniform, and moreover it could get the result to show high enough value.

#### [Effect of the invention]

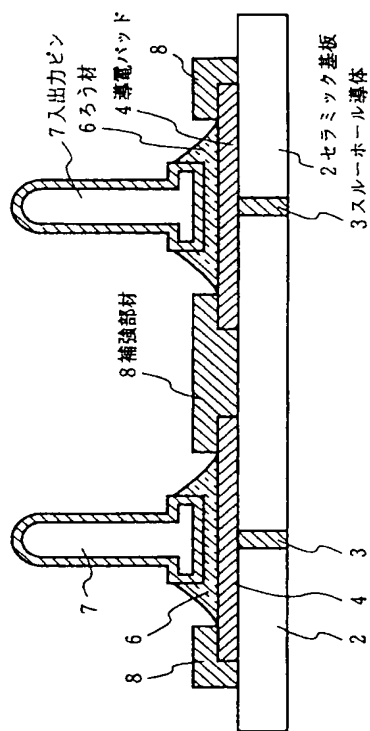
This invention has the effect to get the thickness film printing circuit board with the crowds of people power pin of the higher reliability with the adhesion strength of the I/O pins because the edge part of the conductor pad can be protected with preventing a position deviation with the I/O pins and the conductor pad by setting up dielectric body glass which covers the surroundings of the edge part of the conductor pad that an I/O pins is done as to the one with solder as explaining as mentioned.

#### [Brief Description of the Drawings]

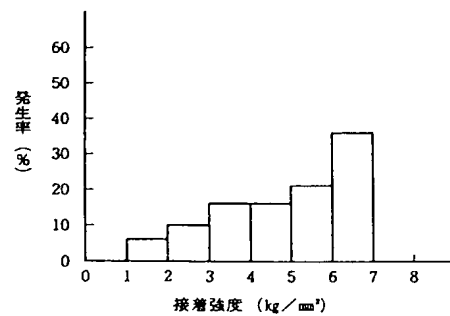
The first figure is the cross section of the thickness film printing circuit board with the I/O pins which 1 solid line example of this invention is shown in. The second figure is the cross section of carbon jig to explain the example of the way of fixing a usual I/O pins. The third figure is the cross section which shows the condition that an I/O pins is fixed on the circuit board. The fourth figure is the graph which shows the distribution of the adhesion strength of the I/O pins which the one with soldering did so far by the method. The fifth figure is the graph which shows the distribution of the adhesion strength of the I/O pins which the one with soldering by the method in the example of this invention.

#### [Description of Notations]

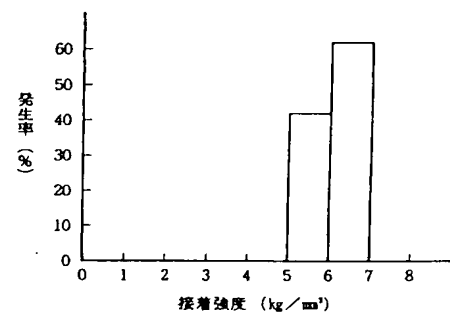
1 a. 1 b, 1 c ...carbon jig、2 ...alumina ceramic substrate、3 ... through hole  
conducting body、4 ...conductive pad、5 ...load、6 ...solder、7 ...I/O pin、8 ...  
reinforcement member



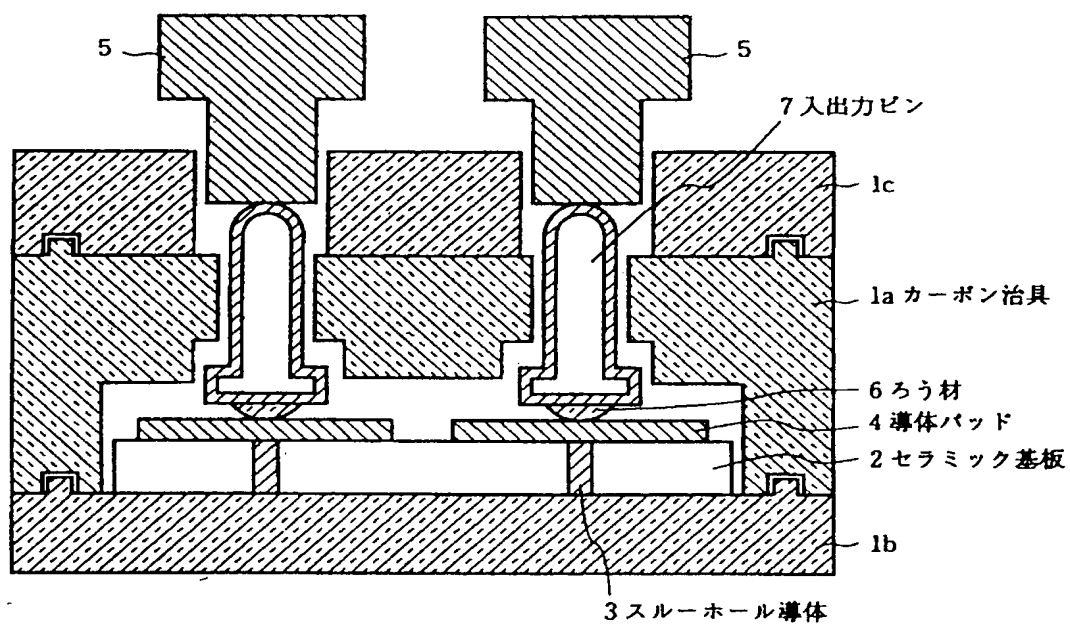
第 1 図



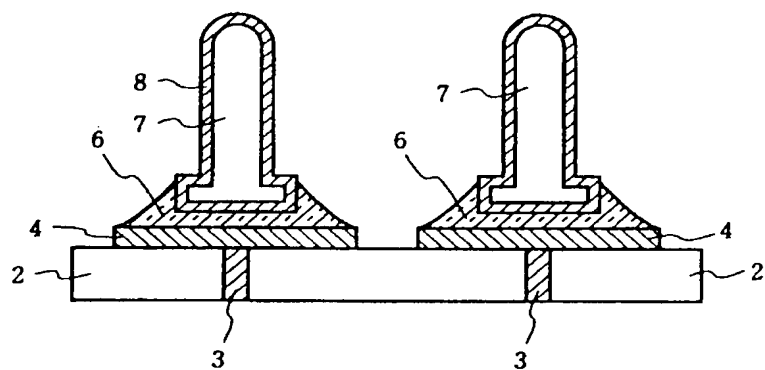
第 4 図



第 5 図



第 2 図



第 3 図